

Title	Demonstrate knowledge of the installation of electrotechnology systems on customer premises		
Level	3	Credits	10

Purpose	<p>This unit standard covers basic principles and concepts and is intended for systems technicians working on customer premises.</p> <p>People credited with this unit standard are able to demonstrate knowledge of:</p> <ul style="list-style-type: none"> – radio principles for extra-low voltage applications and installations; – satellite and terrestrial signal reception and distribution; – non-complex domestic control and automation systems; – TCP/IP networks in terms of their operation and the services provided; – structured cabling networks and data communications; and – electrical, electronic and security principles for electronic security installations.
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Classification	Electrical Engineering > Electrotechnology
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Available grade	Achieved
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Guidance Information

- 1 This unit standard has been developed for learning and assessment off-job.
- 2 The knowledge covered by this unit standard is expected to be at an introductory and non-mathematical level, with the objective of introducing relevant terminology and giving a broad overview of systems installation.
- 3 Definitions
 - Basic knowledge* – employing some operational and theoretical knowledge of the subject matter to interpret available information.
 - CCTV* – closed circuit television.
 - DB9* – a type of 9 pin connector.
 - DHCP* – Dynamic Host Configuration Protocol.
 - DNS* – Domain Name System.
 - Industry practice* – those practices that competent practitioners within the industry recognise as current industry best practice.
 - IPv4* – Internet Protocol Version 4.
 - IPv6* – Internet Protocol Version 6.
 - LAN* – Local Area Network.

LNB – low-noise block downconverter.
LNB/F – low-noise block convertor/feedhorn.
RJ11 – Registered Jack 11.
RJ45 – Registered Jack 45.
SC – Square Connector.
TCP/IP – Transmission Control Protocol/Internet Protocol.
USB – Universal Serial Bus.
WAN – Wide Area Network.
LC – lucent connector.

4 Range

- a Candidates must refer to current legislation and Standards during assessment.
- b All activities and evidence presented for all outcomes and performance criteria in this unit standard must be in accordance with:
 - i legislation;
 - ii policies and procedures;
 - iii ethical codes;
 - iv Standards – may include but are not limited to those listed in Schedule 2 of the Electricity (Safety) Regulations 2010;
 - v applicable site, enterprise, and industry practice;
 - vi where appropriate, manufacturers' instructions, specifications, and data sheets.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of radio principles for extra-low voltage applications and installations.

Range environments – re-locatable, mobile, repeater, marine;
 technology – radio, cellular, GPS.

Performance criteria

1.1 Describe the operation of end-user equipment with reference to the functions of the components.

Range equipment – cellular phone, cellular data device, mobile radio transceiver, GPS receiver, mobile data terminal;
 components may include but are not limited to – microphone, receiver, modulation, display, keypad, antenna.

1.2 Describe the functions of station hardware used in radio network systems by drawing a diagram.

Range base station, repeater station;
 hardware may include but is not limited to – antenna, receiver, transmitter, controller, alarm/quality monitoring, call accounting.

1.3 Describe the functions and features of radio network systems.

Range radio network systems may include but are not limited to – 2G networks, 3G networks, 4G networks, 5G networks, trunked radio, mobile radio, Wi-Fi, data network interconnect.

1.4 Describe interconnection of radio network systems with other networks in terms of features and services offered by the interconnection.

Range radio network systems may include but are not limited to – 2G networks, 3G networks, 4G networks, 5G networks, trunked radio, mobile radio, Wi-Fi.

Outcome 2

Demonstrate knowledge of satellite and terrestrial signal reception and distribution.

Performance criteria

2.1 Compare analogue and digital reception in terms of efficiency, signal, and power requirements.

2.2 Describe the principle of operation of a satellite reception dish with reference to a non-complex consumer installation.

Range equipment – parabolic dish antenna, set-top box, TV; components may include but are not limited to – balun, LNB/F, waveguide, feed line, coaxial cable.

2.3 Explain how a satellite receiver uses different voltages to select polarization and pilot tones to instruct the LNB to select one of two frequency bands.

2.4 Describe how an installation setup is completed to ensure that the satellite and set-top box are communicating to relay the received signal to the TV.

Range cables, cords, remote control devices, power, settings, programming.

2.5 Describe the principle of operation of a terrestrial antenna with reference to a non-complex consumer installation.

Range equipment – terrestrial antenna for digital TV, set-top box, TV.

2.6 Describe the types of terrestrial antennas likely to be used in New Zealand.

Range antenna – yagi, log periodic, phased array, reflective array; wavelength;

2.7 Explain how installation of the terrestrial antenna impacts on the quality of the received signal.

- 2.8 Describe how an installation setup is completed to ensure that the terrestrial antenna and set-top box are communicating to relay the received signal to the TV.

Range cables, cords, remote control devices, amplifiers, power, settings, programming.

Outcome 3

Demonstrate knowledge of non-complex domestic control and automation systems.

Range environments – re-locatable, mobile, domestic;
technologies – radio, cellular, internet, wifi.

Performance criteria

- 3.1 Describe the operation of customer premises equipment generally forming part of home automation by using block diagrams.

Range services may include but are not limited to – lighting, heating, ventilation, air conditioning, security, home appliances, consumer electronics;
equipment may include but is not limited to – switches, sensors, central hub (gateway);
user interface may include but is not limited to – wall mounted terminal, mobile phone software, tablet computer, control panel, web interface;
evidence of three from each is required.

- 3.2 Describe types of protocols used for home automation, advantages, and applications.

Range X10, Ethernet, RS-485, 6LoPWAN, Bluetooth LE (BLE) Zigbee, Z-Wave, WiFi;
evidence of three types is required.

Outcome 4

Demonstrate knowledge of TCP/IP networks in terms of their operation and the services provided.

Performance criteria

- 4.1 Describe the hardware required to permit connection to an existing network in terms of the function and features provided.

Range router, switch, hub, wireless access point.

4.2 Describe configuration of TCP/IP settings to permit connection to an existing network for a given situation.

Range DHCP, fixed IP addressing, DNS, gateway, subnet mask

4.3 Identify physical data interfaces used for IP connections in terms of connector used, application, and transfer speeds.

Range RJ11, RJ45, LC, SC, USB, DB9.

4.4 Describe IP addresses in terms of host and network portions for a given net mask (IPv4) or subnet prefix (IPv6).

Outcome 5

Demonstrate knowledge of structured cabling networks and data communications.

Performance criteria

5.1 Identify and describe the essential components used in data communications in terms of their function.

Range computer, sender, receiver, transmission media, telecommunications provider.

5.2 Explain the difference between a LAN and a WAN.

5.3 Three main types of LAN media are identified and described in terms of their common uses.

Range Copper (CAT5, CAT6); Fibre (single mode, multi-mode); wireless.

5.4 Identify the main LAN topologies of ring, star and bus, or hybrid in terms of their connection, data flow, advantages, and disadvantages.

5.5 Compare TCP and UDP in terms of their media access and transmission methods.

5.6 Identify and describe the principles of data compression and encryption.

Outcome 6

Demonstrate knowledge of electrical, electronic, and security principles for electronic security installations.

Performance criteria

6.1 Describe the purpose and application of electronic intruder alarm system devices.

Range intruder alarm system devices include but are not limited to – passive infra-red (PIR) detector, smoke detector, microwave detector, point-to-point beam, outdoor detectors, duress switch, reed switch, keypad, glass break, seismic sensor, dual detector, internal and external siren, piezo; evidence is required of two applications for each device, including environmental considerations.

6.2 Explain the connection and adjustment for each system device are in accordance with manufacturer specifications.

6.3 Describe the purpose and application of security CCTV, security lighting, access control and intercom systems.

6.4 Identify and describe cable and cable installation requirements necessary to complete a security installation.

6.5 Identify and describe the power supply requirements for an intruder alarm system.

Range plug top and socket outlet, direct wired, battery backup.

Planned review date	31 December 2027
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	14 December 2017	31 December 2024
Review	2	2 March 2023	N/A

Consent and Moderation Requirements (CMR) reference	0003
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact Waihangara Ara Rau Construction and Infrastructure Workforce Development Council at qualifications@waihangaraarau.nz if you wish to suggest changes to the content of this unit standard.